

NON-PUBLIC?: N
ACCESSION #: 9511010404
LICENSEE EVENT REPORT (LER)

FACILITY NAME: McGuire Nuclear Station Unit 1 PAGE: 1 OF 7

DOCKET NUMBER: 05000369

TITLE: A Unit Manual Reactor Trip Was Initiated As A Result Of
An Equipment Failure Caused By An Unknown
EVENT DATE: 09/27/95 LER #: 95-005-00 REPORT DATE: 10/27/95

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100%

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: R. J. Deese, Manager, Safety TELEPHONE: (704) 857-4065
Review Group

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: HBC COMPONENT: VALVOP MANUFACTURER: C311
REPORTABLE NPRDS: Yes

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

Unit Status: Unit 1 - Mode 1 (Power Operations) at 100 percent power.

Event Description: On September 27, 1995, at 0923, a manual Reactor Trip was initiated on Unit 1 after valve 1SM-0007AB, Main Steam Isolation Valve Steam Line A, moved to the fail safe (closed) position. Operations (OPS) personnel quickly realized that valve 1SM-0007AB was closed, and responded in a proactive and conservative manner to manually trip the Unit prior to receiving an Automatic Reactor Trip. All systems responded as required after the trip. Unit 1 was returned to service on September 30, 1995, at 0410.

Event Cause: A cause of Unknown, possible equipment failure, has been assigned. Extensive investigation efforts have been unable to determine an exact mode of failure for the equipment.

Corrective Action: As a conservative measure, the associated fuses, solenoid valve coils, some wiring terminations, and relays were replaced to eliminate recurrence due to any possible intermittent problem with any of these components which could have been undetected during the troubleshooting efforts.

END OF ABSTRACT

TEXT PAGE 2 OF 7

EVALUATION:

Description of Event

On September 27, 1995, Unit 1 was in Mode 1 (Power Operation) at 100 percent power. Train B of the Solid State Protection System (SSPS) EIIS:JC! testing was in progress and Chemical And Volume Control (NV) system EIIS:CB! Centrifugal Charging Pump EIIS:P! 1B, 1NVPU0016 was removed from service for maintenance.

At 0923, Operations (OPS) Control Room EIIS:NA! personnel received annunciator EIIS:ANN! alarms EIIS:ALM! for Steam Generator (SG) EIIS:SG! 1A Flow Mismatch Low Steam Flow and 1A SG Main Steam Isolation Valve (MSIV) EIIS:ISV! closed.

- o The Reactor Operator at the controls (ROATC) immediately noted that the Main Control Board EIIS:MCBD! indication for MSIV 1SM-0007AB, had moved to the fail safe (closed) position.
- o The ROATC announced this to the other OPS Control Room personnel and then attempted unsuccessfully to manually reopen the valve by depressing the OPEN push-button on the Main Control Board.
- o The Senior Reactor Operator (SRO) then instructed the ROATC to manually trip the Reactor EIIS:RCT! prior to receiving an automatic Reactor Trip.
- o The ROATC manually tripped the Reactor at 0923:42. An automatic Turbine Generator EIIS:TG! Trip followed the Reactor trip.
- o OPS personnel entered procedure EP/1/A/5000/E0, Reactor Trip Or Safety Injection, and then entered procedure EP/1/A/5000/ES-0.1, Reactor Trip Response.
- o OPS personnel subsequently entered procedure OP/1/A/6100/05, Unit

Fast Recovery. At this time the SSPS equipment was returned to normal alignment from the test configuration.

- o The 4 hour notification to the NRC was made at 1023 in accordance with procedure RP/0/A/5700/10, NRC Immediate Notification Requirements.

TEXT PAGE 3 OF 7

- o OPS, Maintenance, and Engineering personnel began an investigation to determine the cause of the event. After initial investigation and electrical troubleshooting of the circuits and components associated with MSIV 1SM-0007AB was completed, no apparent cause was found.

Subsequently, a more formal failure analysis was begun. Personnel from Engineering, Maintenance, Operations, and Safety Assurance met and a detailed listing of possible failure modes, both electrical and mechanical, was developed. Discussion was then held to determine failure modes that could be eliminated by information already known about the valve closure, and methods to test the other failure modes that had been identified to determine if they were true failure causes.

- o The main testing activity determined at this meeting was to attempt reopening the valve manually by operating the OPEN push-button on the Main Control Board.

- o Personnel were placed to observe, and measure where possible, key parameters during the reopening attempt.

- o The attempt was then made and the valve was successfully reopened from the OPEN push-button on the Main Control Board. Operation of the valve was completely normal from all observations and readings during this opening.

The failure investigation team was reconvened after this evolution to determine the failure modes eliminated or proved by this test. The Plant Operations Review Committee (PORC) was present during this review meeting.

- o The results of this analysis determined that all identified possible failure modes had been tested and were eliminated with the exception of intermittent failure mode possibilities that did not recur during the test. Also, the possibility existed of some unrecognized interaction with the SSPS testing that had been in progress during the closure event.

o It was decided that several actions needed to be taken in order to address these possibilities. These were:

1. Recreation of the SSPS testing in progress at the time of the original event and then cycling the valve to determine any unrecognized effect from the SSPS testing.

TEXT PAGE 4 OF 7

2. Thermography inspection of the associated terminal cabinets and junction boxes to identify any loose connections (hotter than normal connections) as potential causes of intermittent opening, coupled with additional tightness checking of terminations that could have caused this valve to close if they were broken intermittently.

3. An additional review by Electrical Engineering personnel to confirm that SSPS testing in progress at that time could not have caused the valve to close.

4. Conservatively replacing the fuses EIIS:FU!, some wiring terminations, relays EIIS:RLY!, and coils EIIS:CL! on the solenoid valves EIIS:FSV! associated with this valve, and testing of the removed components. (Replacement of these components, that could possibly be caused by intermittent problems, would allow more thorough testing of components that had been associated with this type event in the past.)

The PORC then met to evaluate restart of the Unit. A decision was made to allow restart with the approval of the Station Manager, contingent upon; (a) completion of the additional activities as discussed during the previous meeting and (b) provided those activities identified no further possible root causes of the event or previously unidentified Nuclear Safety concerns. It was further stipulated that if any concerns were so identified by those activities, the PORC would be reconvened to re-evaluate the restart decision.

o No root cause was found as a result of the additional testing, and based on the decision of the PORC, the Unit was returned to Mode 1, on September 30, 1995, at 0410, with the approval of the Station Manager.

Conclusion

This event did not result in any uncontrolled releases of radioactive

material, personnel injuries, or radiation overexposures. The event is Nuclear Plant Reliability Data System (NPRDS) reportable due to the possible failure of the valve operator for valve 1SM-0007AB.

- o The inadvertent movement of MSIV 1SM-0007AB to the fail safe (closed) position, has been assigned a cause of Unknown, possible equipment failure, since extensive investigation efforts have been unable to determine an exact mode of failure for any of the equipment.

TEXT PAGE 5 OF 7

- o All identified possible failure modes have been tested and were eliminated as valid causes with the exception of possible intermittent failure modes that did not recur during the follow up testing

- o No problems which might have caused the inadvertent closure were found with the fuses, coils, solenoid valves, wiring, circuitry hardware, or logic associated with this valve. However, one of the relays removed did not perform in a manner that was expected for normal operation. Therefore, a possible cause for the event is considered to be failure of the SMART relay contacts 1-1a, associated with the seal in circuitry of the Main Control board push-button for the valve.

- o Testing has revealed that these contacts could be taken to the open circuit condition, which would have resulted in the closing of valve 1SM-0007AB. However, it is also suggested by the testing, that external influence on this relay would have to occur to initiate this condition. Such external influence could have been accomplished by bumping or jarring of the terminal cabinet in which the relay is located, or of the relay itself. No evidence has been found that this had happened at the time of the valve closure. No activities found to be in progress at that time would have caused bumping or jarring of the relay in question. It was also noted that even-though the opening of these contacts would have caused the valve to move to the closed position, it would not have prevented the valve from reopening when the ROATC first attempted to do so from the OPEN pushbutton on the Main Control Board. These facts would refute the failure of the relay contacts as the cause of the valve closure.

A review of the Operating Experience Program (OEP) and Problem Investigation Process (PIP) data bases for the past 24 months revealed no similar reportable events associated with inadvertent movement of MSIVs

to the fail safe (closed) position due to an unknown cause. This event is not considered to be recurring.

CORRECTIVE ACTION:

Immediate:

1. OPS personnel attempted to reopen MSIV 1SM-0007AB by operating the OPEN push-button on the Main Control Board.
2. OPS personnel initiated a Manual Reactor Trip.

TEXT PAGE 6 OF 7

3. OPS personnel entered procedure EP/1/A/5000/E0, Reactor Trip Or Safety Injection, and then entered procedure EP/1/A/5000/ES-0.1, Reactor Trip Response.

Subsequent:

1. OPS personnel entered procedure OP/1/A/6100/05, Unit Fast Recovery.
2. OPS and Maintenance personnel returned the SSPS B Train equipment to normal alignment from the test configuration.
3. Personnel from Engineering, Maintenance, OPS, and Safety Assurance performed a detailed investigation of possible failure modes, both electrical and mechanical.
4. OPS personnel successfully reopened the valve from the Main Control Board.
5. The fuses, relays, and coils from the solenoid valves associated with this valve were conservatively replaced and sent to the Duke Power Company Metallurgy Laboratory for further testing.
6. Electrical Engineering personnel performed additional reviews to confirm that SSPS testing then in progress could not have caused to valve to close.

Planned:

1. The Main Control Board push-button switch for valve 1SM-0007AB will be replaced during outage 1EOC10, and submitted to the Duke Power Company Metallurgy Laboratory for further testing.

SAFETY ANALYSIS:

Based on this analysis, this event is not considered to be significant. At no time were the health and safety of the public or plant personnel affected by this event.

- o The Unit 1 Reactor was manually tripped due to the flow mismatch to SG 1A prior to reaching any automatic trip setpoint.
- o A Turbine Generator Trip was automatic as a result of the manual Reactor Trip.

TEXT PAGE 7 OF 7

This type of trip is bounded by events as described in Chapters 15.2.4, "Inadvertent Closure Of Main Steam Isolation Valves", and 15.2.7, "Loss Of Normal Feedwater Flow", of the McGuire Final Safety Analysis Report (FSAR). The event described in Chapter 15.2.4, is more limiting because it assumes a complete loss of Main Feedwater. The CA system is assumed to provide decay heat removal capability following an automatic Reactor Trip from such a loss of flow.

- o The MSIV involved in this event failed to the fail safe (closed) position.
- o The Main Feedwater (CF) system EIIS:SJ! was available after the trip and continued to provide feedwater flow.
- o The Auxiliary Feedwater (CA) system EIIS:BA! Train A Motor EIIS:MO! Driven pump and the Turbine Driven Auxiliary Feedwater pump started on low-low level in SG 1A, and operated properly to assist in returning SG water levels to normal. The Train B Motor Driven pump did not start due to the Train B alignment for the then ongoing SSPS testing.
- o Main Steam Line Code Safety Valves EIIS:RV! 1SV-0020, 21 and 22 lifted and operated properly to relieve pressure for Loop A Steam Line following the trip. Loop A Steam Line pressure reached 1194 psig. Although valve 1SV-0022 lifted prior to the setpoint of 1205 psig, it was well within allowable tolerance. SG Power Operated Relief Valve, 1SV-0019, also opened and closed properly. All Steam Dump To Condenser valves operated properly. No Atmospheric Dump Valves opened. No Pressurizer EIIS:PZR! Code Safety or Pressurizer Power Operated Relief Valves opened, nor were the setpoints for these valves reached.

o The Primary and Secondary plant parameters were stabilized at no load conditions within 30 minutes following the trip and all plant equipment responded as expected.

ATTACHMENT TO 9511010404 PAGE 1 OF 2

Duke Power Company T. C. McMEEKIN
McGuire Nuclear Generation Department Vice President
12700 Hagers Ferry Road (MG01VP) (704)875-4800
Huntersville, NC 28078-8985 (704)8754809 Fax

DUKE POWER

DATE: October 27, 1995

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: McGuire Nuclear Station Unit 1
Docket No. 50-369
Licensee Event Report 369/95-05, Revision 0
Problem Investigation Process No.: 1-M95-1767

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 369/95-05, Revision 0, concerning a Unit 1 Manual Reactor Trip. This report is being submitted in accordance with 10 CFR 50.73 (a) (2) (iv). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

T.C. McMeekin

RJD/bcb

Attachment

cc: Mr. S.D. Ebnetter INPO Records Center
Administrator, Region II Suite 1500
U.S. Nuclear Regulatory Commission 1100 Circle 75 Parkway
101 Marietta St., NW, Suite 2900 Atlanta, GA 30339
Atlanta, GA 30323

Mr. Victor Nerses Mr. George Maxwell
U.S. Nuclear Regulatory Commission NRC Resident Inspector
Office of Nuclear Reactor Regulation McGuire Nuclear Station
Washington, D.C. 20555

ATTACHMENT TO 9511010404 PAGE 2 OF 2

bxc: B.L. Walsh (EC11C)
Zack Taylor (CNS)
G.A. Copp (EC050)
J.I. Glenn (MG02ME)
P.R. Herran (MG01VP)
Cindy Davis (MG01CP)
J.E. Burchfield (ONS Reg Compliance)
G. H. Savage (EC06E)
G.B. Swindlehurst (EC11-0842)
M.S. Tuckm
n (EC07H)
R.F. Cole (EC05N)
R. M. Frye (EC05N)
Tim Becker (PB02L)
P.M. Abraham (EC08I)
R. B. White (MG01VP)
L.V. Wilkie (ON03SR)
D.P. Kimball (CN05SR)
NSRB Support Staff (EC05N)
Kay Crane (MG01RC)
Rich Casler (EC05N)

*** END OF DOCUMENT ***
